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## New Species of *Rhabdochona* Railliet, 1916 (Nemata: Rhabdochoniidae) from Rainbow Trout in California Streams

ARMAND R. MAGGENTI,<sup>1</sup> FAWZIA ABDEL-RAHMAN,<sup>1,2</sup> AND I. CID DEL PRADO VERA<sup>1,3</sup>

**Abstract:** Three new species of *Rhabdochona* Railliet, 1916 are described and illustrated from *Salmo gairdneri* Richardson (rainbow trout) in freshwater streams in California: *Rhabdochona californiensis* n. sp., *R. paxmani* n. sp., and *R. salmonis* n. sp. *Rhabdochona californiensis* n. sp. is characterized by 14 anteriorly directed teeth in the prostome, egg devoid of filaments or floats, male and female tail terminus with a single mucro, left (long) spicule slender with a moderate distended podoid terminal end, spicular ratio 1:3.8. *Rhabdochona paxmani* n. sp. is characterized by 10 teeth in the prostome, eggs with polar floats, left (long) spicule slender with podoid terminus distended and having a minute subterminal spine; right spicule with prominent gorgeret (barb), spicular ratio 1:4.3, male and female tail terminus with a cuticular conical rounded short projection. *Rhabdochona salmonis* n. sp. is characterized by 10 teeth anteriorly directed in the prostome, eggs with polar floats, left spicule slender with a distended podoid terminus; right spicule with a sharply indented gorgeret, spicular ratio 1:4.3, male and female tail terminus with a conical or rounded tip.

**Key words:** California, nematode, rainbow trout, *Rhabdochona californiensis* n. sp., *R. paxmani* n. sp., *R. salmonis* n. sp., *Salmo gairdneri*.

During surveys, conducted by A. R. Maggenti and G. A. Paxman, of parasitic nematodes of rainbow trout, *Salmo gairdneri* Richardson from freshwater streams of California, specimens of the genus *Rhabdochona* Railliet, 1916 were found attached throughout the gastrointestinal tract of the host. The most common sites of attachment were in the stomach and hindgut. However, specimens were also found attached in the esophagus and pyloric caeca. Three new species of *Rhabdochona* collected during these surveys are herein described. Both *Bulbodacnitis ampullastoma* Maggenti, 1971 and *Sterliadochona pedispicula* Maggenti and Paxman, 1971 were found as associates with the nematodes described here.

### MATERIALS AND METHODS

Live nematodes were removed from the host's alimentary tract at necropsy, killed in hot water at 60 C and fixed in 4% formalin. For light microscope studies, male

and female nematodes were processed for permanent mounts in glycerin following Thorne's technique (14). Specimens selected for scanning electron microscopy were processed as reported by Abdel-Rahman and Maggenti (1). Nematodes were mounted on stubs, coated with gold 300–400 Å, and viewed with a ISI-DS 130 dual-stage scanning electron microscope using an accelerating voltage of 10 kV. Illustrations were prepared with the aid of a camera lucida.

In the descriptions, prostome refers to the anterior, funnel-shaped (infundibular) portion of the stoma, and vestibule to the cylindrical posterior portion of the stoma. Stoma length includes prostome and vestibule. Spicular ratio is the relationship of the short right to long left spicule. All measurements are given in micrometers, unless otherwise designated. Parenthetical numbers are the mean and standard deviation.

### TAXONOMY

*Rhabdochona californiensis* n. sp.  
(Figs. 1 and 2)

### Dimensions

**Holotype (male):** Length 5.9 mm; width 120; prostome 18; stoma 105; from anterior extremity: deirids 74, nerve ring 169,

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excretory pore 326; anterior muscular esophagus 0.33 mm; posterior glandular esophagus 1.40 mm; total esophagus 1.73 mm; tail 350; right spicule 114; left spicule 374; spicular ratio 1:3.3; a = 49.2; b = 3.41; c = 16.8.

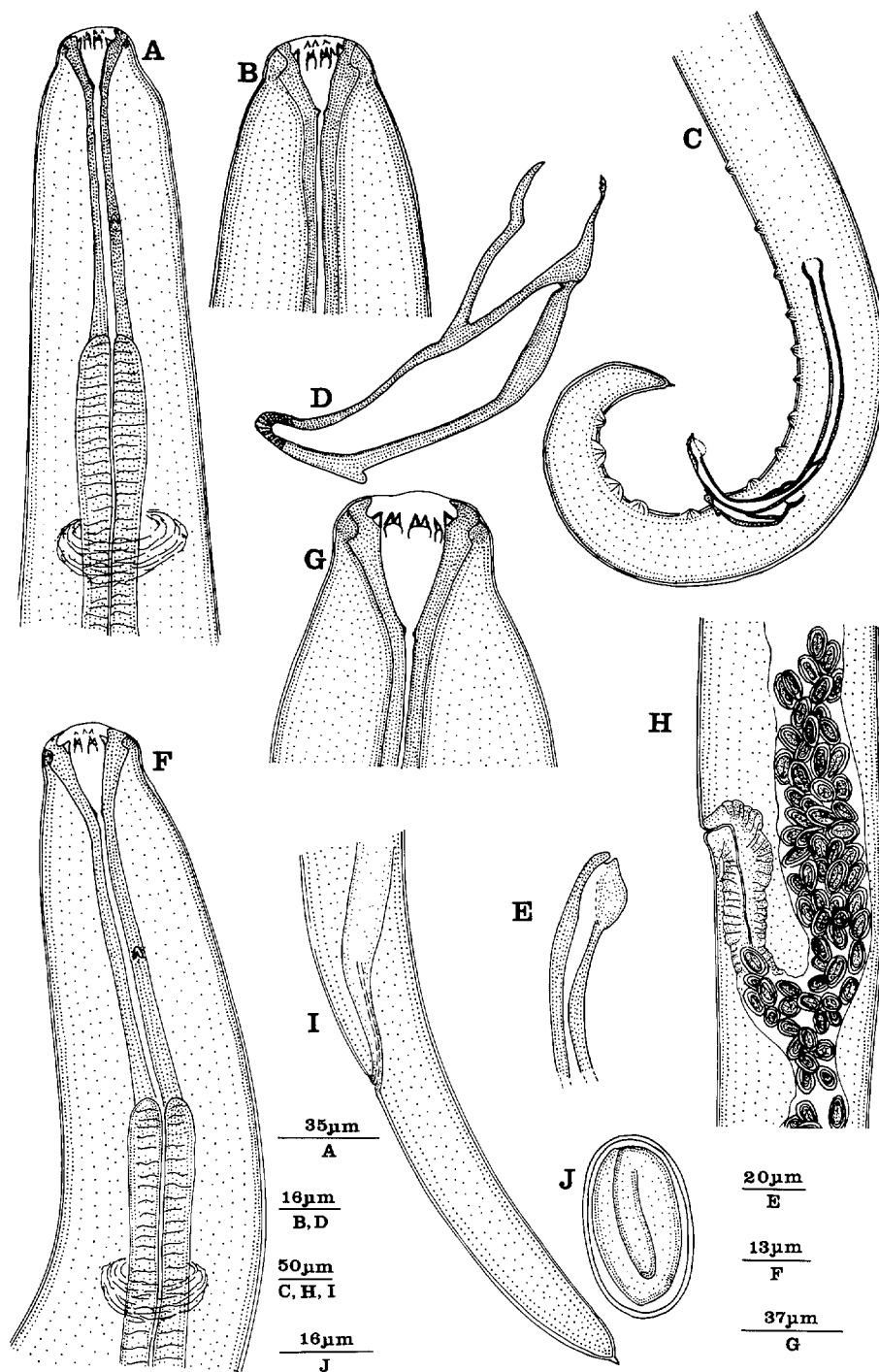


FIG. 1. *Rhabdochona californiensis* n. sp. Male. A) Anterior end, lateral. B) Anterior extremity. C) Posterior region. D) Right (short) spicule. E) Terminus of left (long) spicule. Female. F) Anterior extremity, lateral. G) Anterior region. H) Vulval region. I) Posterior region. J) Embryonated egg.

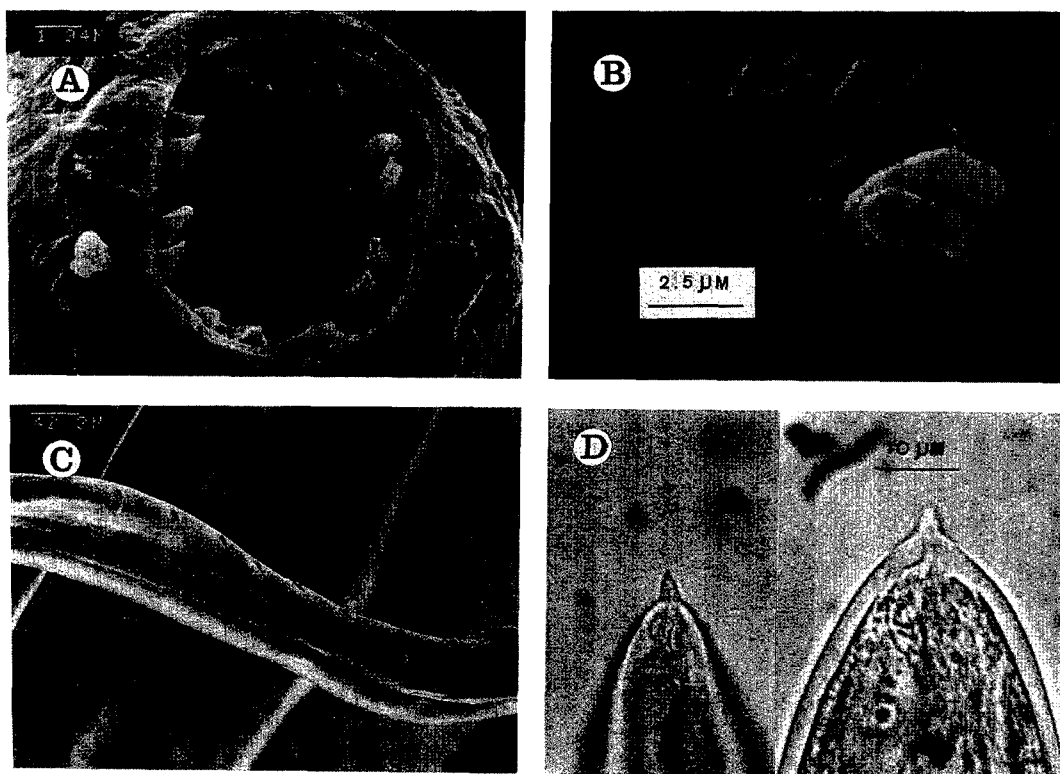


FIG. 2. *Rhabdochona californiensis* n. sp. SEM micrographs. Male. A) Face view. B) Deirid. C) Precloacal papillae. D) Tail tips: male left, female right.

*Male* ( $n = 10$ ): Length 5.4–8.1 mm ( $6.1 \pm 0.76$ ); width 110–140 ( $120 \pm 9$ ); prostome 17–21 ( $19 \pm 2$ ); stoma 90–115 ( $103 \pm 8$ ); from anterior extremity: deirids 53–81 ( $70 \pm 9$ ), nerve ring 151–199 ( $169 \pm 15$ ), excretory pore 265–336 ( $301 \pm 20$ ); anterior muscular esophagus 0.27–0.40 mm ( $0.33 \pm 0.04$ ); posterior glandular esophagus 1.31–2.06 mm ( $1.51 \pm 0.23$ ); total esophagus 1.62–2.46 mm ( $1.86 \pm 0.31$ ); tail 310–430 ( $380 \pm 40$ ); right (short) spicule 91–126 ( $110 \pm 10$ ); left (long) spicule 374–494 ( $417 \pm 34$ ); spicular ratio 1:3.3–4.4 ( $1:3.8 \pm 0.32$ );  $a = 47.7$ –57.8 ( $52 \pm 2.88$ );  $b = 2.98$ –3.66 ( $3.36 \pm 22$ );  $c = 13.8$ –20.8 ( $16.3 \pm 2.07$ ).

Testis single, reflexed. Ten pre-cloacal papillae, nine pair subventral, one pair sublateral at level of third subventral pair anterior to cloaca; postcloacal papillae not symmetrically paired, five on left side of tail, seven on right side. Spicules unequal. Left spicule long, cylindrical, di-

stal end conspicuously distended with rounded ventral protuberance and short terminal digitate distal projection; right spicule broadly curved, distinct acute barb (gorgeret) behind tip. Tail elongate conical, terminus with small spicate mucro.

*Female* ( $n = 10$ ): Length 8.72–10.67 mm ( $10 \pm 0.62$ ); width 180–200 ( $191 \pm 9$ ); prostome 24–28 ( $26 \pm 1$ ); stoma 107–135 ( $120 \pm 9$ ); from anterior extremity: deirids 53–86 ( $73 \pm 13$ ), nerve ring 185–220 ( $203 \pm 12$ ), excretory pore 310–380 ( $336 \pm 23$ ); anterior muscular esophagus 0.33–0.49 mm ( $0.42 \pm 0.05$ ); posterior glandular esophagus 1.85–2.04 mm ( $2.03 \pm 0.17$ ); total esophagus 2.21–2.86 mm ( $2.45 \pm 0.19$ ); vulva from anterior extremity 4.26–5.68 mm ( $5.12 \pm 0.39$ );  $V = 48.8$ –53.2% ( $51.0 \pm 1.56$ ); vagina length 260–330 ( $300 \pm 31$ ); tail 320–410 ( $377 \pm 34$ ); rectum 100–140 ( $121 \pm 15$ );  $a = 48.4$ –58.6 ( $52.5 \pm 3.33$ );  $b = 3.7$ –4.6 ( $4.2 \pm 0.29$ );  $c = 24.4$ –33.1 ( $26.8 \pm 2.7$ ).

Vulva at or slightly posterior to mid-body; vagina cuticularized, ovjector muscular, and directed posteriorly; telogonic gonads, diovarial amphidelphic, ovaries with numerous flexures, anterior ovary reaches junction of esophagointestinal valve, posterior ovary reaches nearly to rectum. Eggs oval, shell smooth; egg length (embryonated) 31–37 ( $33.5 \pm 1.7$ ); width 18–20 ( $19 \pm 0.70$ ).

#### Description

Ten male and ten female nematodes. Both sexes body slender, cylindrical in shape, tapering more posteriorly than anteriorly, anterior extremity rounded. Cuticle smooth, fine transverse striations visible by SEM only. Stoma opening hexagonal or almost oval, lips indistinct. Cephalic sensilla eight, inner circle of four on border of oral opening at laterodorsal and lateroventral positions, outer circle of four posterior to oral opening, positioned laterodorsally and lateroventrally. Amphid apertures small, circular, opening into lateral cuticular depressions. Stoma bipartite, prostome infundibulate, lined with longitudinal cuticular ribs terminating anteriorly as 14 teeth; prostome base with small denticle-like projections. Vestibule (posterior stoma) cylindrical, narrow, and elongated. Deirids bifurcate, inverted V-shaped, posterior to midstoma. Nerve ring at level of anterior third of anterior muscular esophagus. Excretory pore at level or just anterior to junction of muscular and glandular esophagus. Esophagus bipartite, anterior part short, muscular, posterior long, glandular, esophagointestinal valve present. Tail elongated, terminus conoid with spicate mucro.

#### Type specimens

*Holotype (male)*: Collected July 4, 1970, by G. A. Paxman. Catalogue No. UCNC 2142, University of California Davis Nematode Collection. *Paratypes*: Eleven females and eleven males, same data as holotype. Eight females and eight males deposited in University of California Davis Nematode Collection. Catalogue No. 2143

and 2144. Three females and three males deposited at Instituto de Biología, Lab. Helminthologia, UNAM, Mexico.

#### Type host

Rainbow trout, *Salmo gairdneri* Richardson.

*Site*: Stomach, pyloric caeca, hindgut.

#### Type locality

Oregon Creek, Nevada County, California, U.S.A.

#### Etymology

Named for the state of California.

#### Differential diagnosis

*Rhabdochona californiensis* n. sp. is characterized by 14 anteriorly directed teeth in the prostome, egg devoid of filaments or floats, male and female tail terminus with a single mucro and spicular ratio of 1:3.8.

*Rhabdochona californiensis* n. sp. in having 14 teeth in the stoma and a smooth egg shell without filaments or floats resembles other *Rhabdochona* spp. from North America such as *R. cascaddilla* Widgor, 1918 (15), *R. decaturensis* Gustafson, 1949 (6), and *R. kidderi* Pearse, 1936 (11). In these characteristics, it also resembles *R. acuminata* (Molin, 1860) Gendre, 1921 (5), *R. phoxini* Moravec, 1968 (9), and *R. denudata* (Dujardin, 1845) Railliet, 1916 (12).

*Rhabdochona californiensis* can be distinguished from *R. cascaddilla*, topotype measurements, Choquette, L. P. E. (3), by males being larger in most comparative measurements, body length (5.4–8 mm) 6.1 mm versus (3.87–5.42 mm) 4.64 mm; stoma (90–115) 103 versus (73–77) 70; prostome (17–21) 19 versus (14–16) 15; total esophagus length (1.62–2.46 mm) 1.86 mm versus (1.17–1.70 mm) 1.41 mm; muscular esophagus (0.27–0.40 mm) 0.33 mm versus (0.15–0.20 mm) 0.18 mm; posterior glandular esophagus (1.31–2.06 mm) 1.51 mm versus (1.01–1.50 mm) 1.28 mm; excretory pore from anterior extremity (151–199) 169 versus (120–140) 130; tail

length (310–430) 380 versus (220–290) 260.

Females of *R. californiensis* can be distinguished from *R. cascadiella* by: greater body length, 10 versus 7.8 mm; prostome, 26 versus 18; stoma, 120 versus 99; anterior esophagus, 0.42 versus 0.23; posterior esophagus, 2.03 versus 1.68; total esophagus, 2.45 versus 1.92; excretory pore from anterior, 336 versus 230; tail length 377 versus 260.

*Rhabdochona californiensis* can be readily distinguished from *R. decaturensis* by its shorter left spicule 374–494 versus 820–1,025; from *R. kidderi* by its shorter left spicule 374–494 versus 1,000–1,080 and lower spicular ratio 1:3.8 versus 1:12.4.

Other *Rhabdochona* spp. not from North America but resembling *R. californiensis* in having 14 teeth and nonfilamented eggs are *R. acuminata*, *R. phoxini*, and *R. denudata*. *Rhabdochona californiensis* can be separated from *R. acuminata* by the deirid shape, reportedly simple in *R. acuminata*, Moravec, 1972 (10); deirid position, 53–81 for *R. californiensis* versus 15–51. The spicular ratio is higher for *R. acuminata* 1:5.0 versus 1:3.8, the left spicule longer, 576–591 versus 374–494, and the excretory pore is more anterior, 237 versus 301. Females differ by the position of the vulva and tail length. In *R. californiensis*, the vulva is more anteriorly placed, 51% versus 60%, and the tail is longer, 320–410 versus 225–240.

*Rhabdochona californiensis* differs from *R. phoxini* in the form of the deirid, which in the latter is reportedly simple (9). *Rhabdochona californiensis* also is longer (5.4–8.1 versus 5.1–5.6 mm; females 8.72–10.7 versus 7.75–8.63 mm), has a more posterior excretory pore (males 265–336 versus 195–240, females 310–380 versus 249), a longer tail: (male 310–430 versus 237–240; female, 320–410 versus 163–189) and longer spicules than *R. phoxini* (right spicule, 91–126 versus 69–84; left spicule, 374–494 versus 222–284).

*Rhabdochona californiensis* males can be distinguished from *R. denudata* by their length (5.4–8.1 versus 4.86–5.14 mm, the

more posterior position of the excretory pore (265–336 versus 177–198), and length of the left spicule (374–494 versus 249–255). Males and females of *R. californiensis* can be distinguished from *R. denudata* by their greater tail length (male tail, 310–430 versus 193–258; female tail, 320–410 versus 168–231).

*Rhabdochona californiensis* can be distinguished from other rhabdochonids of salmonids: *R. onchorhynchi* (Fujita, 1927) (4), *R. salvelini* Fujita, 1927 (4); *R. kisutchi* Margolis, Moravec, and McDonald, 1975 (8), *R. paxmani* n. sp. and *R. salmonis* n. sp. by having 14 teeth in the prostome. It can be distinguished from *R. sulaki* Saidov, 1953 (13), a parasite of *Salmo trutta* L., by the absence of egg ornamentation. *R. sulaki* eggs have at each pole a long, wide filament of fibrous structure that may be as much as 0.3 mm in length.

*Rhabdochona paxmani* n. sp.  
(Figs. 3 and 4)

*Dimensions*

*Holotype (male)*: Length 6.4 mm; width 130; prostome 23; stoma 121; from anterior extremity: deirids 72, nerve ring 170, excretory pore 280; anterior muscular esophagus 0.29 mm; posterior glandular esophagus 1.95 mm; total esophagus 2.24 mm; right spicule 115; left spicule 530; spicular ratio 1:4.6; tail 290; a = 49.5; b = 2.87; c = 22.2.

*Male* (n = 7): Length 6.39–7.34 mm (6.71 ± 0.37); maximum width 120–150 (130 ± 10); stoma 113–127 (120 ± 6.0); prostome 18–25 (22 ± 2); from anterior extremity: deirids 70–78 (73 ± 3), nerve ring 129–180 (162 ± 18), excretory pore 209–297 (272 ± 36); anterior muscular esophagus 0.29–0.41 mm (0.36 ± 0.37); posterior glandular esophagus 1.80–2.15 mm (2.01 ± 0.114); total esophagus 2.15–2.49 mm (2.37 ± 0.13); tail 260–370 (330 ± 50); right spicule 115–135 (125 ± 7); left spicule 482–579 (538 ± 36); spicular ratio 1:3.8–4.6 (1:4.3 ± 0.34); a = 44.3–61.2 (51.9 ± 5.52); b = 2.6–3.1 (2.8 ± 0.20); c = 19.7–24.6 (20.7 ± 2.58).

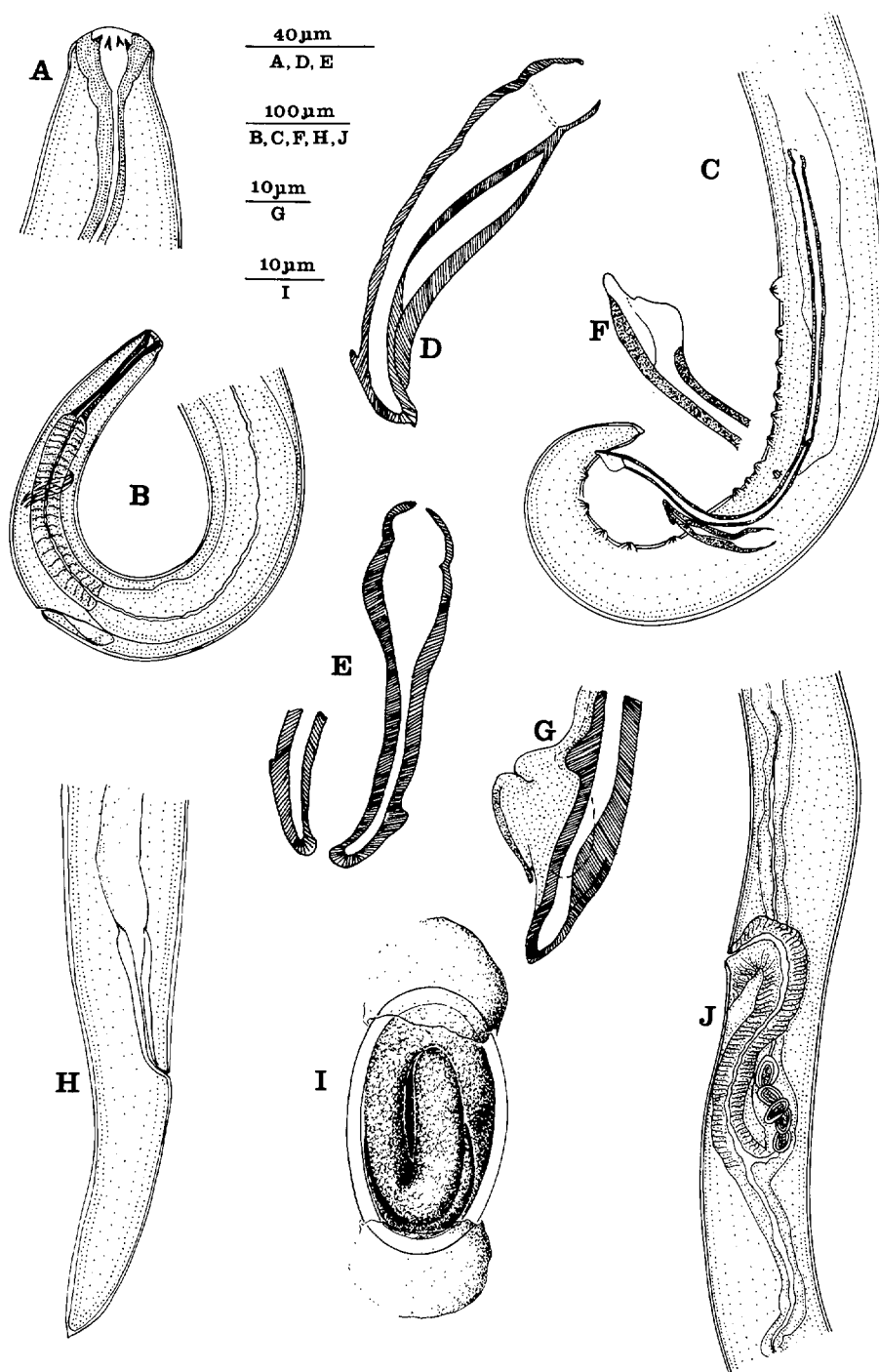


FIG. 3. *Rhabdochona paxmani* n. sp. Male. A) Anterior end, lateral. B) Anterior. C) Posterior. D,E) Right (short) spicule. F,G) Terminus of left (long) spicule. H) Female posterior region. I) Egg. J) Vulval region.

Testis single, anteriorly directed to level of esophagointestinal valve, then reflexed. Ten paired precloacal papillae, nine pairs

subventral and one pair sublateral, at level of third subventral papillae anterior to cloaca. Postcloacal papillae in six pairs, two

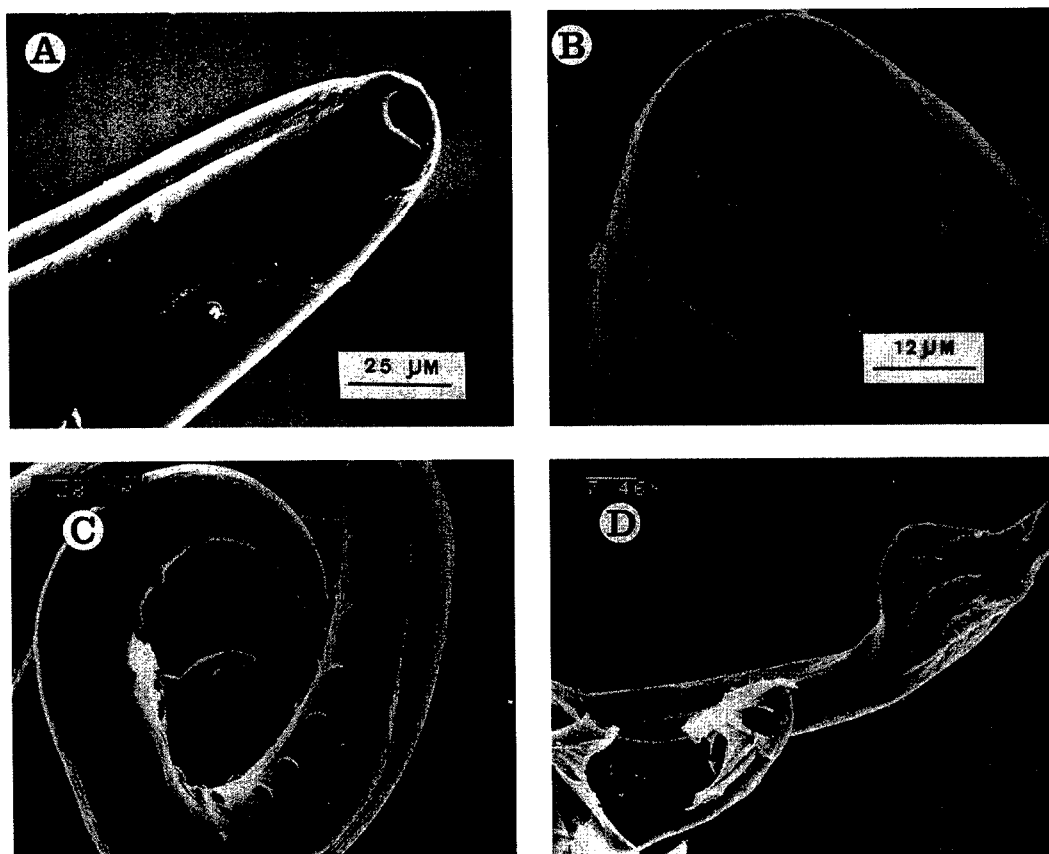


FIG. 4. *Rhabdochona paxmani* n. sp. SEM micrographs. Male. A) Anterior body. B) Face view. C) Posterior showing post- and preloacal papillae. D) Left spicule, distal end with minute spine near the terminus (arrow).

pairs adjacent to cloaca (one subventral, one lateroventral), four pairs subventral along tail. Left spicule slender, with greatly distended podate terminus having a ventral, conical rounded protuberance distally digitate, a minute spine (SEM) immediately before digitate tip. Right spicule, wide anterior end, distal end with well-developed dorsal gorgeret.

**Female** ( $n = 10$ ): Length 9.8–13.8 mm ( $11.6 \pm 1.07$ ); maximum width 180–210 ( $199 \pm 11$ ); stoma 120–170 ( $150 \pm 20$ ); from anterior extremity: deirids 70–110 ( $90 \pm 15$ ), nerve ring 160–210 ( $194 \pm 22$ ), excretory pore 250–360 ( $320 \pm 39$ ); anterior muscular esophagus 0.37–0.49 mm ( $0.41 \pm 0.05$ ); posterior glandular esophagus 1.92–3.04 mm ( $2.25 \pm 0.33$ ); total esophagus 2.51–3.53 mm ( $2.66 \pm 0.35$ ); vulva from anterior extremity 3.85–6.68

mm ( $5.53 \pm 0.82$ ); V = 34–51.4% ( $47.68 \pm 5.23$ ); vagina length 330–410 ( $362 \pm 26$ ); tail 250–340 ( $306 \pm 29$ ); a = 49–62.7 ( $57 \pm 4.8$ ); b = 3.9–4.9 ( $4.37 \pm 0.36$ ); c = 30.6–44.8 ( $38.2 \pm 4.4$ ).

Vulva, most often, slightly anterior to midbody, vagina cuticularized, ovijector muscular, directed posteriorly, telogonic gonads, diovarial, ampidelphic, ovaries with numerous flexures. Eggs embryonated, with polar floats, egg length 33–38 ( $35 \pm 2$ ); width 20–23 ( $21 \pm 0.01$ ).

#### Description

Ten females and seven males. Both sexes body slender, cylindrical, anterior extremity rounded, posterior extremity gradually tapering. Stoma opening hexagonal to oval; lips absent, two cuticular lobes (rudimentary pseudolabia) border stoma



laterally (Fig. 4B). Amphid apertures small, circular, opening posterior to lateral cuticular lobes. Cephalic sensilla eight, inner four sensilla encircle stoma opening, two laterodorsal and two lateroventral; outer four sensilla posterior to stoma opening, at level of amphids, two laterodorsal and two lateroventral. Cuticle smooth, fine transverse striations visible by SEM, except on the cephalic region. Stoma conspicuously cuticularized, bipartite, prostome wide, infundibulate, vestibule elongate, narrow and cylindrical. Prostome with 10 longitudinal ribs terminating anteriorly as teeth. Deirids bifurcate, inverted V-shaped, at level of midstoma. Esophagus anterior short, muscular followed by a long wide glandular part. Nerve ring surrounds muscular esophagus at level of anterior third. Excretory pore posterior to nerve ring, anterior to junction between anterior and posterior esophagus. Esophagointestinal valve present. Tail conical, terminus rounded or pointed, without mucro.

#### *Type specimens*

*Holotype (male)*: Collected 7/4/70 by G. A. Paxman. Catalogue No. UCNC 2139, University of California Davis Nematode Collection.

*Paratypes*: Ten females and five males. Same data as holotype, eight females and three males deposited in University of California Davis Nematode Collection, Catalogue Nos. 2140 and 2141. Two females and two males deposited at Instituto de Biología, Lab. Helminthología, UNAM Mexico.

#### *Type host*

Rainbow trout, *Salmo gairdneri* Richardson.

*Site*: Intestine, pyloric caeca, and hindgut.

#### *Type locality*

Digger Creek, Shasta County, California.

#### *Etymology*

Named for Gaylen A. Paxman, research associate of first author for 22 years.

#### *Differential diagnosis*

*Rhabdochona paxmani* is characterized by 10 teeth in the prostome, eggs with polar floats, right spicule with prominent gorgeret, spicular ratio 1:4.3 and tail terminus with a cuticular rounded short projection.

*Rhabdochona paxmani* differs from all described species from North America except *R. kisutchi* Margolis et al., 1975 (8) and *R. salmonis* n. sp. by having 10 teeth in the buccal cavity. *Rhabdochona paxmani* differs from *R. kisutchi* by having only polar floats without variable formations, including single extended tendrils. Females of *R. paxmani* further differ by shorter body length (9.8–13.8 mm versus 12.04–17.38), a more anterior excretory pore (250–360 versus 411–420) and a shorter tail (250–340). Males of *R. paxmani* can be distinguished from those of *R. kisutchi* by their shorter prostome (18–25 versus 24–27), their longer anterior muscular esophagus (290–410 versus 225–270), their shorter left spicule (482–579 versus 564–660), by having a well-developed dorsal gorgeret as opposed to a feeble gorgeret at the tip of *R. kisutchi*'s right spicule, and by spicular ratios 1:3.8–4.6 versus 1:4.8–6.5.

Four previously described species are reported to have egg floats: *R. barusi* Majumdar and De, 1971 (7) and *R. gambiana* Gendré, 1921 (5) have four floats circumferentially arranged; *R. singhi* Ali, 1956 (2) has three circumferential floats; *R. kisutchi* has already been distinguished.

#### *Rhabdochona salmonis* n. sp.

(Figs. 5 and 6)

#### *Dimensions*

*Holotype (male)*: Length, 8.8 mm; width, 150; stoma, 131; prostome, 21; from anterior extremity: deirid 65, nerve ring 192, excretory pore 290; anterior muscular esophagus 0.43 mm; posterior glandular esophagus 2.49 mm; total esophagus, 292

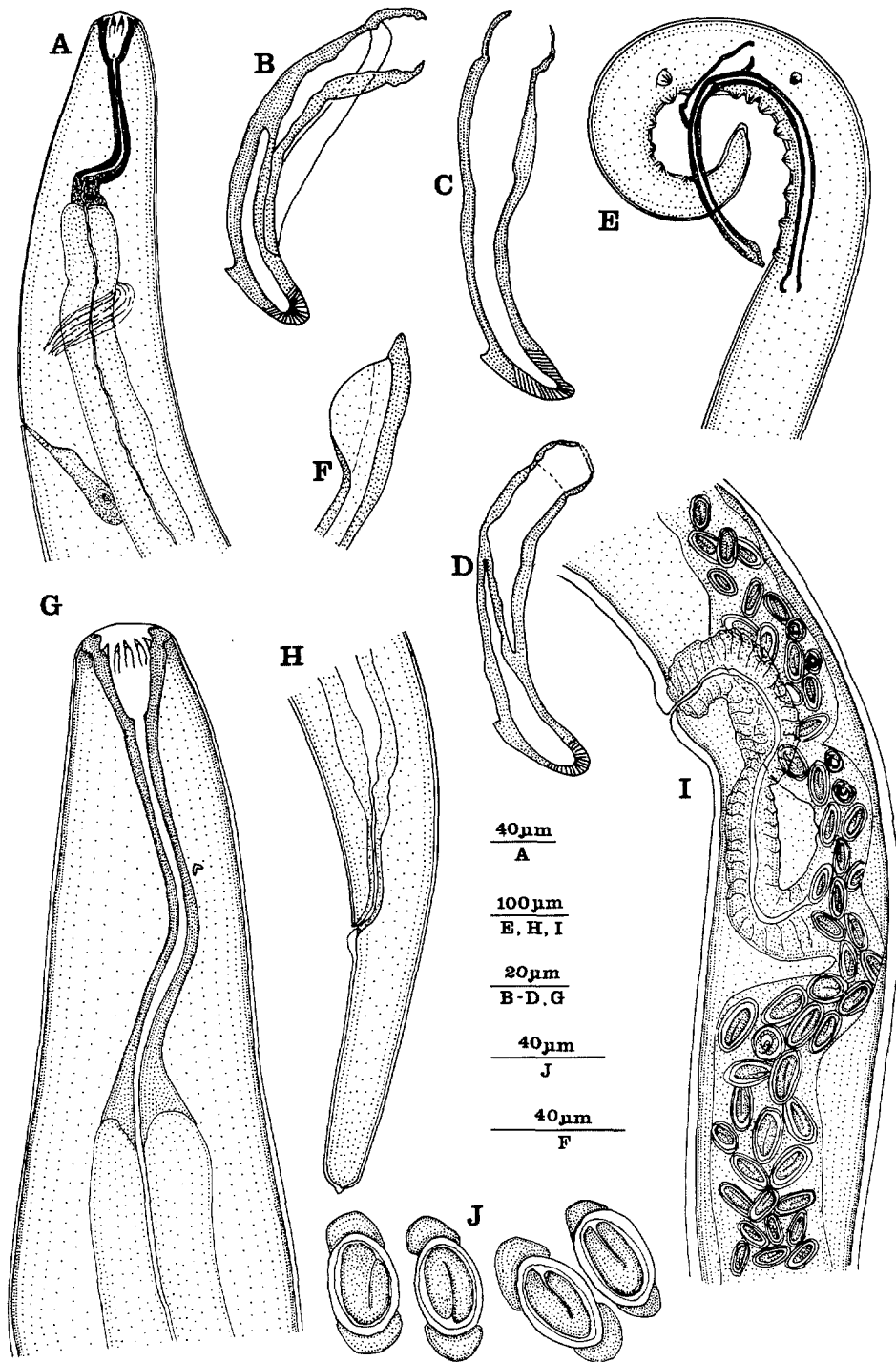


FIG. 5. *Rhabdochona salmonis* n. sp. Male. A) Anterior. B,C,D) Right spicule. E) Posterior region. F) Distal end of left (long) spicule. Female. G) Anterior region. H) Posterior region. I) Vulval region. J) Eggs.

mm; tail, 390; right spicule 140; left spicule 650; spicular ratio 1:4.6; a = 58.7; b = 4.0; c = 29.3.

*Male* ( $n = 8$ ): Length 5.94–10.5 mm ( $8.62 \pm 1.30$ ); width 120–170 ( $143 \pm 16$ ); stoma 118–165 ( $138 \pm 14$ ); prostome 19–

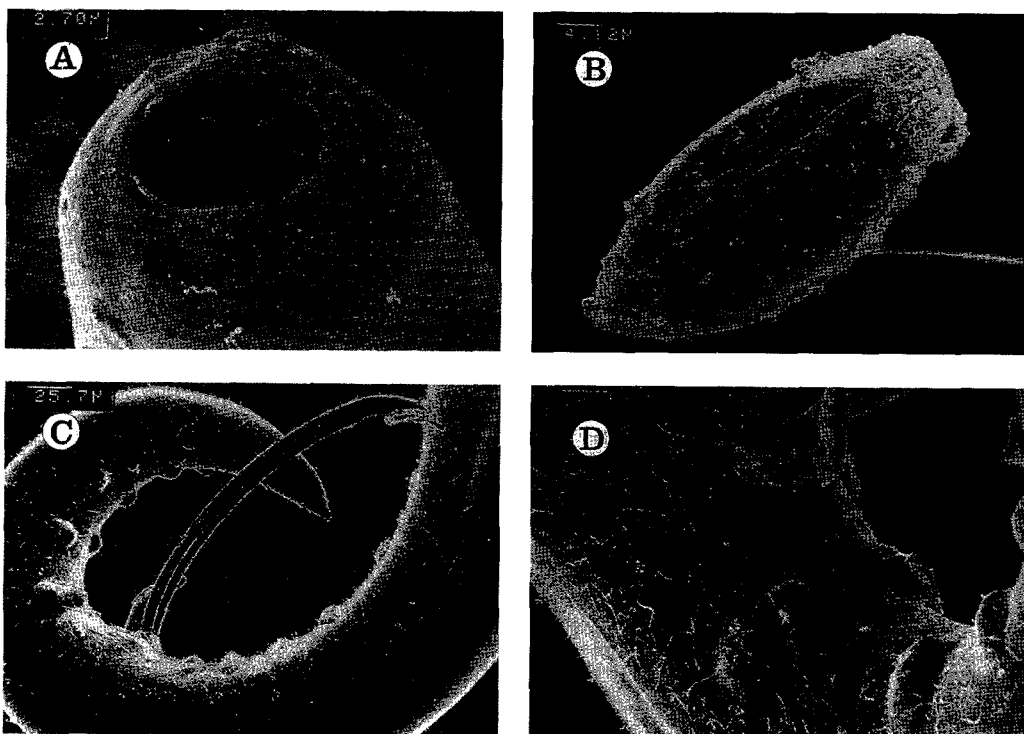


FIG. 6. *Rhabdochona salmonis* n. sp. SEM micrographs. Male. A) Face view. Egg. B) Shows polar caps. Male. C) Posterior region. D) Distal end of right (short) spicule and postcloacal papillae.

26 ( $22 \pm 2$ ); from anterior extremity: deirid 65–93 ( $75 \pm 10$ ), nerve ring 137–263 ( $195 \pm 37$ ), excretory pore 213–443 ( $315 \pm 70$ ); anterior muscular esophagus 0.36–0.53 mm ( $0.43 \pm 0.06$ ); posterior glandular esophagus 1.71–2.90 mm ( $2.29 \pm 0.34$ ); total esophagus 2.07–3.39 mm ( $2.72 \pm 0.37$ ); tail 350–530 ( $430 \pm 60$ ); right (short) spicule 117–140 ( $133 \pm 8$ ); left (long) spicule 514–649 ( $580 \pm 37$ ); spicular ratio 1:4.2–4.6 ( $4.3 \pm 0.13$ ); a = 49.5–70.0 ( $59.98 \pm 7.34$ ); b = 3.1–4.0 ( $3.3 \pm 0.34$ ); c = 16.8–29.3 ( $21 \pm 4.22$ ).

Testis single, reflexed. Precloacal papillae of unequal number on each side of body. Left side with eight subventral and one lateroventral at level of third subventral papilla from cloaca. Right side with nine subventral and one lateroventral at midlevel between second and third subventral papillae. Postcloacal papillae, one pair on each side, next to cloaca at subventral and lateroventral positions, and four

subventral papillae on each side of tail. Spicules unequal in length; right spicule short, wide, with sharp dorsal preterminal gorgeret. Left spicule long, flexible, distal end with cuticular inflated foot-like process.

*Female* ( $n = 6$ ): Length 13–20 mm ( $15.7 \pm 2.81$ ); width 210–310 ( $261 \pm 34.6$ ); stoma 137–173 ( $154 \pm 15$ ); prostome 26.9–30.7 ( $29 \pm 1.54$ ); from anterior extremity: deirid 69–137 ( $94 \pm 30.9$ ), nerve ring 123–284 ( $213 \pm 62$ ), excretory pore 246–333 ( $270 \pm 42$ ); anterior muscular esophagus 0.28–0.38 mm ( $0.33 \pm 0.03$ ); posterior glandular esophagus 2.06–3.40 mm ( $2.69 \pm 0.68$ ); total esophagus 2.4–4.0 mm ( $3.0 \pm 0.73$ ); vulva to anterior extremity 4.8–9.7 mm ( $7.1 \pm 1.8$ ); V = 36.3–50.0% ( $44.9 \pm 4.98$ ); vagina length 38–65 ( $52 \pm 12.4$ ); ovijector 300–483 ( $385 \pm 92$ ); tail 280–420 ( $340 \pm 59$ ); a = 54.94–65.14 ( $59.98 \pm 4.18$ ); b = 3.73–5.80 ( $5.25 \pm 0.77$ ); c = 40.7–49.6 ( $45.6 \pm 2.96$ ).

Vulva near midbody or slightly anterior, slightly protruding, posterior lip more developed than anterior lip. Vagina cuticular sigmoid, 38–65 ( $52 \pm 14$ ) long; ovijector, 300–483 ( $385 \pm 92.1$ ) (including vagina); gonads diovarial amphidelphic, ovaries with multiple flexures. Eggs with polar floats, embryonated, egg length 34–36 ( $35 \pm 0.34$ ), width 19–22 ( $21 \pm 0.69$ ).

#### Description

Eight males and six females. Both sexes body slender, cylindrical, tapering towards both extremities, more so posteriorly. Male posterior body region coils when killed. Anterior extremities of both sexes rounded to truncate. Body cuticle finely striated (visible only by SEM). Stoma hexagonal, lateral sides with two small cuticular lobes (pseudolabia), posterior to which open small slit-like amphid apertures. Cephalic sensilla four, two laterodorsal, two lateroventral. Stoma cuticularized, bipartite, prostome infundibulate, lined with 10 longitudinal cuticular ridges terminating anteriorly as teeth. Prostome base apparently bearing small teeth. Vestibule cylindrical, narrow, elongate. Esophagus bipartite: anterior part short, narrow, muscular, posterior long part, broad, glandular. Deirids bifurcate, at midstoma level. Nerve ring at level of anterior third of anterior muscular esophagus. Excretory pore posterior to nerve ring, anterior to junction of muscular and glandular esophagus; esophagointestinal valve present. Tail conical, terminus rounded or slightly pointed.

#### Type specimens

*Holotype (male)*: Collected August 1976 by A. R. Maggenti. Catalogue No. UCNC 2145, University of California Davis Nematode Collection.

*Paratypes*: Six males, four females. Same collection data as holotype. Four males and four females deposited at University of California Davis Nematode Collection, Catalogue No. 2146 and 2147; two females and two males deposited at Instituto de

Biologia Lab.; Helminthologia, UNAM, Mexico.

#### Type host

Rainbow trout *Salmo gairdneri* Richardson.

*Site*: stomach and hindgut.

#### Type locality

Rattlesnake Creek, Glenn County, California.

#### Etymology

From the latin *salmo*, *-onis* for trout or salmon.

#### Differential diagnosis

*Rhabdochona salmonis* n. sp. is characterized by 10 teeth anteriorly directed in the prostome, eggs with polar floats, right spicule with sharply indented gorgeret and spicular ratio of 1:4.3, tail terminus rounded tip.

*Rhabdochona kisutchi* from a salmonid is closely related to *R. salmonis* in having 10 prostomal teeth as well as ornamented eggs. However, *R. salmonis* can be readily distinguished from *R. kisutchi* by the longer anterior esophagus in the male (0.36–0.53 mm versus 0.23–0.27 mm), the spicular ratio, (1:4.2–4.6 versus 1:4.8–6.48), and tail length (0.35–0.53 versus 0.30–0.39). The tip of the right spicule of *R. salmonis* has a sharply indented dorsal gorgeret, which is feebly developed and usually indistinct in *R. kisutchi*. Females can be separated by the shorter prostome (27–30 versus 30–36) and the more anterior excretory pore (246–333 versus 411–420). The eggs also differ: no eggs, among thousands observed from several sacrificed females, had other than polar floats; none was observed to have tendrils, long filaments, or truncated filaments as sometimes observed among eggs of *R. kisutchi*.

Other species of *Rhabdochona* with floats differ in float placement and number. *R. barusi* Majumdar and De, 1971 (7) and *R. gambiana* Gendreau, 1921 (5) have four cir-

cumferential and equally spaced floats of unequal size, prominent alternating with less prominent. *R. singhi* Ali, 1956 (2) has three circumferential egg floats.

#### DISCUSSION

Margolis et al. (8) discussed the use of the separate generic designations *Rhabdochona*, *Filochona*, and *Globochona* that were proposed on the basis of egg ornamentation: *Rhabdochona*, shell smooth or with a feebly distinguishable flock-like coating; *Filochona*, with eggs having filaments; and *Globochona*, with eggs having hemispherical (lateral circumferential) floats. They concluded that these designations best served a taxonomic purpose at the level of subgeneric identity. However, in their discussion they state, "our recent studies indicate that the character of eggs in this genus does not always reflect the actual relationships and that the division into subgenera is, to a certain extent, artificial." *Rhabdochona kisutchi* has both polar floats and filaments within any given population and was, therefore, placed in *Filochona* by Moravec et al. The implication that floats developed into filaments or filaments into floats without further study is disquieting.

We have chosen not to use a subgeneric designation because of the arbitrary nature of taxonomic placement on the basis of egg ornamentation. Two of our species (*R. paxmani* and *R. salmonis*) have polar floats, and we have never observed among the thousands of embryonated, mature eggs any hint of a filament or strand. Therefore, we do not believe that these species should be placed in any of the admittedly arbitrary subgenera.

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